



PHOENIX
TECHNOLOGY SERVICES

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DEC 11 2018

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COG Operating LLC

**Lea County, NM (NAD83 NME)
Shovel Head Federal Com
28H**

OH

Survey: Phoenix MWD Surveys

Standard Survey Report

01 August, 2018





Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD83 NME)
Site: Shovel Head Federal Com
Well: 28H
Wellbore: OH
Design: Surveys (Double K 7)

Local Co-ordinate Reference: Well 28H
TVD Reference: RKB @ 4107.00usft (Double K 7)
MD Reference: RKB @ 4107.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Project Lea County, NM (NAD83 NME)

Map System: US State Plane 1983
Geo Datum: North American Datum 1983
Map Zone: New Mexico Eastern Zone

System Datum: Mean Sea Level

Site Shovel Head Federal Com

Site Position:
From: Lat/Long
Position Uncertainty: 0.00 usft
Northing: 676,071.26 usft
Easting: 711,040.45 usft
Slot Radius: 13-3/16 "
Latitude: 32° 51' 26.36028 N
Longitude: 103° 46' 50.45808 W
Grid Convergence: 0.30 °

Well 28H

Well Position +N/-S 0.00 usft
+E/-W 0.00 usft
Position Uncertainty 0.00 usft
Northing: 676,101.20 usft
Easting: 711,039.50 usft
Wellhead Elevation: usft
Latitude: 32° 51' 26.65656 N
Longitude: 103° 46' 50.46749 W
Ground Level: 4,090.00 usft

Wellbore OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	6/27/2018	7.02	60.80	48,329.80475708

Design Surveys (Double K 7)

Audit Notes:

Version: 1.0
Phase: ACTUAL
Tie On Depth: 0.00

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	89.33

Survey Program Date 8/1/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	5,305.00	Scientific Gyro Surveys (OH)	Scientific Gyro	Scientific Drilling Intl. Standard Wireline Keeper
5,401.00	14,209.00	Phoenix MWD Surveys (OH)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,305.00	6.60	282.34	5,287.43	70.19	-229.10	-228.26	0.00	0.00	0.00
Tie In									
5,401.00	4.54	284.91	5,382.97	72.35	-238.16	-237.30	2.16	-2.15	2.68
First Phoenix MWD Survey									
5,465.00	2.65	276.84	5,446.84	73.17	-242.08	-241.21	3.05	-2.95	-12.61
5,527.00	1.17	262.48	5,508.81	73.26	-244.13	-243.26	2.49	-2.39	-23.16
5,559.00	1.10	256.57	5,540.80	73.15	-244.75	-243.88	0.43	-0.22	-18.47
5,591.00	1.07	254.96	5,572.80	73.00	-245.34	-244.47	0.13	-0.09	-5.03
5,622.00	0.44	126.37	5,603.80	72.85	-245.52	-244.65	4.48	-2.03	-414.81

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5,654.00	3.08	92.09	5,635.78	72.75	-244.57	-243.70	8.52	8.25	-107.13
5,685.00	6.67	86.42	5,666.66	72.83	-241.94	-241.07	11.67	11.58	-18.29
5,717.00	10.47	82.32	5,698.30	73.34	-237.20	-236.32	12.02	11.88	-12.81
5,749.00	14.76	83.80	5,729.52	74.17	-230.26	-229.38	13.44	13.41	4.63
5,780.00	18.72	86.80	5,759.20	74.87	-221.36	-220.47	13.07	12.77	9.68
5,812.00	21.47	90.72	5,789.25	75.08	-210.38	-209.49	9.56	8.59	12.25
5,843.00	23.99	93.67	5,817.84	74.61	-198.41	-197.53	8.92	8.13	9.52
5,906.00	31.63	92.24	5,873.52	73.14	-169.08	-168.22	12.17	12.13	-2.27
5,969.00	38.33	90.54	5,925.11	72.31	-133.00	-132.14	10.75	10.63	-2.70
6,032.00	43.86	88.74	5,972.58	72.61	-91.61	-90.75	8.98	8.78	-2.86
6,095.00	45.21	88.57	6,017.48	73.64	-47.44	-46.57	2.15	2.14	-0.27
6,158.00	46.41	88.95	6,061.40	74.62	-2.28	-1.40	1.95	1.90	0.60
6,221.00	47.59	89.09	6,104.36	75.41	43.79	44.67	1.88	1.87	0.22
6,284.00	49.05	88.72	6,146.25	76.31	90.83	91.72	2.36	2.32	-0.59
6,347.00	55.61	88.70	6,184.73	77.43	140.66	141.56	10.41	10.41	-0.03
6,411.00	64.67	89.40	6,216.56	78.33	196.10	197.00	14.19	14.16	1.09
6,474.00	67.74	89.73	6,241.98	78.77	253.74	254.64	4.90	4.87	0.52
6,537.00	72.50	89.62	6,263.40	79.11	312.96	313.87	7.56	7.56	-0.17
6,600.00	80.16	90.59	6,278.27	78.99	374.13	375.03	12.25	12.16	1.54
6,662.00	87.73	92.28	6,284.81	77.44	435.72	436.60	12.51	12.21	2.73
6,726.00	91.15	92.82	6,285.43	74.59	499.64	500.48	5.41	5.34	0.84
6,789.00	91.63	92.43	6,283.91	71.71	562.56	563.36	0.98	0.76	-0.62
6,852.00	90.56	91.41	6,282.70	69.60	625.51	626.28	2.35	-1.70	-1.62
6,915.00	90.24	90.13	6,282.26	68.75	688.50	689.26	2.09	-0.51	-2.03
6,979.00	90.61	89.44	6,281.79	68.99	752.50	753.25	1.22	0.58	-1.08
7,041.00	88.68	89.44	6,282.17	69.60	814.49	815.25	3.11	-3.11	0.00
7,105.00	89.14	89.52	6,283.39	70.18	878.48	879.24	0.73	0.72	0.13
7,168.00	89.72	89.13	6,284.02	70.92	941.47	942.23	1.11	0.92	-0.62
7,231.00	88.79	89.00	6,284.84	71.95	1,004.46	1,005.23	1.49	-1.48	-0.21
7,293.00	88.93	89.09	6,286.07	72.98	1,066.43	1,067.22	0.27	0.23	0.15
7,356.00	89.35	89.46	6,287.01	73.78	1,129.42	1,130.21	0.89	0.67	0.59
7,420.00	89.30	90.36	6,287.77	73.88	1,193.42	1,194.20	1.41	-0.08	1.41
7,484.00	89.44	90.97	6,288.47	73.13	1,257.41	1,258.18	0.98	0.22	0.95
7,546.00	89.56	91.39	6,289.01	71.86	1,319.39	1,320.14	0.70	0.19	0.68
7,609.00	88.24	91.18	6,290.22	70.45	1,382.36	1,383.09	2.12	-2.10	-0.33
7,673.00	88.12	90.81	6,292.26	69.33	1,446.32	1,447.03	0.61	-0.19	-0.58
7,735.00	89.51	90.44	6,293.54	68.66	1,508.30	1,509.00	2.32	2.24	-0.60
7,798.00	89.95	90.20	6,293.83	68.31	1,571.30	1,571.99	0.80	0.70	-0.38
7,861.00	88.87	89.59	6,294.48	68.42	1,634.30	1,634.99	1.97	-1.71	-0.97
7,924.00	88.70	89.36	6,295.82	69.00	1,697.28	1,697.97	0.45	-0.27	-0.37
7,987.00	89.92	89.07	6,296.58	69.86	1,760.27	1,760.96	1.99	1.94	-0.46
8,050.00	90.30	88.84	6,296.46	71.01	1,823.26	1,823.96	0.71	0.60	-0.37
8,081.00	90.04	89.76	6,296.36	71.39	1,854.25	1,854.96	3.08	-0.84	2.97

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8,143.00	90.10	89.58	6,296.29	71.75	1,916.25	1,916.96	0.31	0.10	-0.29
8,206.00	90.48	89.45	6,295.97	72.28	1,979.25	1,979.96	0.64	0.60	-0.21
8,269.00	91.04	90.16	6,295.13	72.49	2,042.24	2,042.95	1.44	0.89	1.13
8,332.00	90.67	90.20	6,294.19	72.30	2,105.24	2,105.94	0.59	-0.59	0.06
8,395.00	90.22	89.96	6,293.71	72.21	2,168.23	2,168.93	0.81	-0.71	-0.38
8,458.00	91.10	89.95	6,292.98	72.26	2,231.23	2,231.92	1.40	1.40	-0.02
8,521.00	90.75	89.85	6,291.96	72.37	2,294.22	2,294.91	0.58	-0.56	-0.16
8,588.00	90.27	91.10	6,291.37	71.81	2,361.21	2,361.89	2.00	-0.72	1.87
8,651.00	90.13	90.98	6,291.15	70.67	2,424.20	2,424.86	0.29	-0.22	-0.19
8,714.00	89.02	90.69	6,291.61	69.75	2,487.19	2,487.84	1.82	-1.76	-0.46
8,777.00	90.30	91.10	6,291.99	68.77	2,550.18	2,550.81	2.13	2.03	0.65
8,841.00	91.12	91.25	6,291.19	67.45	2,614.17	2,614.78	1.30	1.28	0.23
8,904.00	89.98	89.96	6,290.59	66.79	2,677.16	2,677.75	2.73	-1.81	-2.05
8,964.00	89.22	89.13	6,291.01	67.27	2,737.15	2,737.75	1.88	-1.27	-1.38
9,027.00	90.15	89.12	6,291.35	68.23	2,800.14	2,800.75	1.48	1.48	-0.02
9,090.00	91.21	89.48	6,290.61	69.00	2,863.13	2,863.74	1.78	1.68	0.57
9,153.00	91.33	89.59	6,289.21	69.51	2,926.12	2,926.73	0.26	0.19	0.17
9,216.00	90.24	89.40	6,288.35	70.06	2,989.11	2,989.72	1.76	-1.73	-0.30
9,279.00	90.65	89.13	6,287.86	70.87	3,052.10	3,052.72	0.78	0.65	-0.43
9,342.00	89.93	88.72	6,287.54	72.05	3,115.09	3,115.72	1.32	-1.14	-0.65
9,405.00	89.78	88.71	6,287.70	73.47	3,178.07	3,178.71	0.24	-0.24	-0.02
9,468.00	88.84	88.76	6,288.46	74.86	3,241.05	3,241.70	1.49	-1.49	0.08
9,531.00	89.79	89.36	6,289.21	75.89	3,304.04	3,304.70	1.78	1.51	0.95
9,594.00	90.07	89.52	6,289.29	76.51	3,367.03	3,367.70	0.51	0.44	0.25
9,658.00	88.65	89.46	6,290.00	77.08	3,431.02	3,431.69	2.22	-2.22	-0.09
9,721.00	89.32	89.35	6,291.12	77.73	3,494.01	3,494.68	1.08	1.06	-0.17
9,784.00	90.07	89.38	6,291.45	78.43	3,557.01	3,557.68	1.19	1.19	0.05
9,847.00	88.59	88.90	6,292.19	79.37	3,619.99	3,620.67	2.47	-2.35	-0.76
9,914.00	89.95	88.97	6,293.04	80.62	3,686.97	3,687.66	2.03	2.03	0.10
9,973.00	90.20	89.41	6,292.97	81.45	3,745.97	3,746.66	0.86	0.42	0.75
10,036.00	89.24	89.69	6,293.27	81.95	3,808.96	3,809.66	1.59	-1.52	0.44
10,099.00	90.12	90.20	6,293.63	82.01	3,871.96	3,872.66	1.61	1.40	0.81
10,162.00	90.93	90.62	6,293.05	81.56	3,934.96	3,935.64	1.45	1.29	0.67
10,225.00	91.13	90.33	6,291.92	81.04	3,997.94	3,998.62	0.56	0.32	-0.46
10,289.00	90.33	90.18	6,291.10	80.75	4,061.94	4,062.60	1.27	-1.25	-0.23
10,352.00	90.59	90.26	6,290.60	80.51	4,124.94	4,125.60	0.43	0.41	0.13
10,415.00	89.87	89.97	6,290.34	80.38	4,187.93	4,188.59	1.23	-1.14	-0.46
10,478.00	89.84	90.23	6,290.50	80.27	4,250.93	4,251.58	0.42	-0.05	0.41
10,541.00	88.82	89.90	6,291.24	80.20	4,313.93	4,314.57	1.70	-1.62	-0.52
10,604.00	89.27	89.88	6,292.29	80.32	4,376.92	4,377.56	0.71	0.71	-0.03
10,667.00	89.64	90.12	6,292.89	80.32	4,439.92	4,440.55	0.70	0.59	0.38
10,730.00	89.18	90.12	6,293.54	80.19	4,502.91	4,503.54	0.73	-0.73	0.00
10,793.00	88.05	90.14	6,295.06	80.05	4,565.89	4,566.52	1.79	-1.79	0.03
10,856.00	88.33	90.53	6,297.05	79.68	4,628.86	4,629.48	0.76	0.44	0.62

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10,919.00	88.44	90.54	6,298.83	79.09	4,691.83	4,692.44	0.18	0.17	0.02
10,982.00	88.87	90.62	6,300.30	78.45	4,754.81	4,755.40	0.69	0.68	0.13
11,044.00	89.07	90.89	6,301.42	77.64	4,816.80	4,817.38	0.54	0.32	0.44
11,106.00	89.18	91.06	6,302.37	76.58	4,878.78	4,879.34	0.33	0.18	0.27
11,169.00	89.24	90.77	6,303.23	75.58	4,941.77	4,942.31	0.47	0.10	-0.46
11,232.00	89.05	90.20	6,304.17	75.04	5,004.76	5,005.29	0.95	-0.30	-0.90
11,295.00	89.64	89.70	6,304.89	75.10	5,067.75	5,068.28	1.23	0.94	-0.79
11,359.00	90.22	88.84	6,304.97	75.91	5,131.75	5,132.28	1.62	0.91	-1.34
11,422.00	90.55	88.97	6,304.55	77.12	5,194.73	5,195.28	0.56	0.52	0.21
11,483.00	91.02	89.34	6,303.71	78.02	5,255.72	5,256.27	0.98	0.77	0.61
11,545.00	91.33	89.59	6,302.44	78.60	5,317.70	5,318.26	0.64	0.50	0.40
11,609.00	91.78	89.94	6,300.71	78.86	5,381.68	5,382.23	0.89	0.70	0.55
11,673.00	91.61	89.91	6,298.81	78.94	5,445.65	5,446.20	0.27	-0.27	-0.05
11,736.00	90.38	88.85	6,297.72	79.62	5,508.64	5,509.19	2.58	-1.95	-1.68
11,799.00	89.33	88.06	6,297.88	81.32	5,571.61	5,572.18	2.09	-1.67	-1.25
11,863.00	89.62	88.31	6,298.46	83.35	5,635.58	5,636.17	0.60	0.45	0.39
11,926.00	89.93	88.86	6,298.71	84.90	5,698.56	5,699.16	1.00	0.49	0.87
11,989.00	90.44	89.29	6,298.51	85.92	5,761.55	5,762.16	1.06	0.81	0.68
12,053.00	90.12	88.98	6,298.20	86.89	5,825.54	5,826.16	0.70	-0.50	-0.48
12,114.00	89.30	88.31	6,298.50	88.33	5,886.52	5,887.15	1.74	-1.34	-1.10
12,175.00	89.72	88.43	6,299.03	90.06	5,947.49	5,948.14	0.72	0.69	0.20
12,237.00	89.99	88.77	6,299.18	91.58	6,009.48	6,010.14	0.70	0.44	0.55
12,298.00	90.42	89.14	6,298.96	92.69	6,070.47	6,071.13	0.93	0.70	0.61
12,360.00	90.52	89.77	6,298.46	93.28	6,132.46	6,133.13	1.03	0.16	1.02
12,421.00	88.78	90.42	6,298.83	93.18	6,193.46	6,194.12	3.04	-2.85	1.07
12,483.00	88.99	90.87	6,300.03	92.48	6,255.44	6,256.09	0.80	0.34	0.73
12,544.00	89.50	91.25	6,300.84	91.35	6,316.42	6,317.06	1.04	0.84	0.62
12,606.00	89.65	91.10	6,301.30	90.08	6,378.41	6,379.03	0.34	0.24	-0.24
12,667.00	89.25	90.36	6,301.88	89.31	6,439.40	6,440.01	1.38	-0.66	-1.21
12,729.00	89.50	90.54	6,302.56	88.82	6,501.40	6,501.99	0.50	0.40	0.29
12,790.00	89.62	90.93	6,303.03	88.04	6,562.39	6,562.97	0.67	0.20	0.64
12,852.00	89.61	90.74	6,303.45	87.13	6,624.38	6,624.95	0.31	-0.02	-0.31
12,913.00	89.76	89.75	6,303.78	86.87	6,685.38	6,685.94	1.64	0.25	-1.62
12,974.00	90.02	89.95	6,303.90	87.03	6,746.38	6,746.93	0.54	0.43	0.33
13,035.00	90.42	89.97	6,303.66	87.07	6,807.38	6,807.93	0.66	0.66	0.03
13,097.00	90.16	88.77	6,303.35	87.76	6,869.37	6,869.93	1.98	-0.42	-1.94
13,159.00	90.45	88.98	6,303.02	88.97	6,931.36	6,931.93	0.58	0.47	0.34
13,220.00	90.50	89.05	6,302.51	90.02	6,992.35	6,992.92	0.14	0.08	0.11
13,281.00	90.56	89.31	6,301.95	90.90	7,053.34	7,053.92	0.44	0.10	0.43
13,342.00	90.59	89.48	6,301.34	91.54	7,114.33	7,114.92	0.28	0.05	0.28
13,404.00	90.88	89.59	6,300.54	92.04	7,176.32	7,176.91	0.50	0.47	0.18
13,465.00	90.87	89.71	6,299.61	92.41	7,237.32	7,237.90	0.20	-0.02	0.20
13,527.00	89.44	89.42	6,299.44	92.89	7,299.31	7,299.90	2.35	-2.31	-0.47

Company: COG Operating LLC
Project: Lea County, NM (NAD83 NME)
Site: Shovel Head Federal Com
Well: 28H
Wellbore: OH
Design: Surveys (Double K 7)

Local Co-ordinate Reference: Well 28H
TVD Reference: RKB @ 4107.00usft (Double K 7)
MD Reference: RKB @ 4107.00usft (Double K 7)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,588.00	89.52	89.73	6,300.00	93.34	7,360.31	7,360.90	0.52	0.13	0.51
13,650.00	89.70	90.27	6,300.42	93.34	7,422.31	7,422.89	0.92	0.29	0.87
13,711.00	90.10	90.84	6,300.53	92.75	7,483.30	7,483.88	1.14	0.66	0.93
13,773.00	90.38	91.15	6,300.27	91.67	7,545.29	7,545.85	0.67	0.45	0.50
13,834.00	89.84	89.55	6,300.15	91.30	7,606.29	7,606.84	2.77	-0.89	-2.62
13,895.00	89.99	89.22	6,300.24	91.95	7,667.29	7,667.84	0.59	0.25	-0.54
13,957.00	90.08	89.49	6,300.20	92.65	7,729.28	7,729.84	0.46	0.15	0.44
14,018.00	90.07	89.71	6,300.12	93.08	7,790.28	7,790.84	0.36	-0.02	0.36
14,080.00	90.18	89.72	6,299.99	93.38	7,852.28	7,852.84	0.18	0.18	0.02
14,141.00	90.35	90.11	6,299.70	93.48	7,913.28	7,913.83	0.70	0.28	0.64
14,154.00	90.47	90.18	6,299.61	93.44	7,926.28	7,926.83	1.07	0.92	0.54
Final Phoenix MWD Survey									
14,209.00	90.47	90.18	6,299.16	93.27	7,981.27	7,981.82	0.00	0.00	0.00
Projection to TD									

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,305.00	5,287.43	70.19	-229.10	Tie In
5,401.00	5,382.97	72.35	-238.16	First Phoenix MWD Survey
14,154.00	6,299.61	93.44	7,926.28	Final Phoenix MWD Survey
14,209.00	6,299.16	93.27	7,981.28	Projection to TD

COG

SURVEY REPORT

SHOVEL HEAD FEDERAL COM #028H

DOUBLE K7 K7

7/22/2018



The Ultimate Partner In Wellbore Placement

SURVEY REPORT**SHOVEL HEAD FEDERAL COM #028H****KEEPER GYRO SURVEY**

CUSTOMER
PROJECT
FIELD

COG
Shovel Head Federal Com #028H
N/A

SDI JOB NO.
SDI DISTRICT
SDI KIT/UNIT

OP:011769
Midland

SITE INFORMATION

Site Name
Lat/Long
Northing
Easting

Shovel Head Federal Com #028H
32.85765° N, 103.78078° W
678,363.7 ft
705,942.4 ft

Section
Township
Range

MAP INFORMATION

North Reference
Grid Correction
System
Datum
Map Zone

Grid North
-0.30 deg
US State Plane 1983
North American Datum 1983 (GRS 1980)
New Mexico East: 3001

**WELL INFORMATION**

Lat/Long
Northing
Easting
UWI

32.85765° N, 103.78078° W

30-025-44519

DEPTH AND ELEVATION REFERENCE

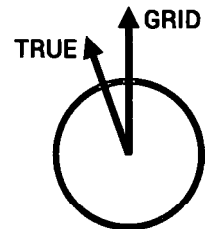
Ground Level
Reference Datum
Reference Height
Reference Elevation

4090 ft above Mean Sea Level
RKB
18 ft above G.L.
4108 ft

VERTICAL SECTION REFERENCE

+N/-S
+E/-W
Proposal Direction
Calculation Method

0 ft
0 ft
89.33°
Minimum Curvature

**LOCAL GRAVITY REFERENCE INFORMATION**

Local Gravity
True to Grid

998.489 mG [computed]
subtract 0.3°

WELL NOTES

Keeper Gyro Survey

OPERATORS

Troy Morgan

SDI Operator Name (Printed)

SIGNATURE

DATE

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	°/100ft	ft	deg
0.00	0.00	0.00	0.00	0.00	0.00	0.00	Invalid	0.00	0.00
100.00	0.54	316.84	100.00	-0.32	0.34	-0.32	0.54	0.47	316.84
125.00	0.57	99.70	125.00	-0.28	0.41	-0.28	4.21	0.50	325.56
150.00	0.76	113.87	150.00	0.00	0.32	-0.01	0.98	0.32	358.79
175.00	0.74	101.49	174.99	0.30	0.22	0.30	0.65	0.38	53.68
200.00	0.68	95.72	199.99	0.61	0.18	0.61	0.39	0.63	73.89
225.00	0.74	85.75	224.99	0.92	0.17	0.92	0.55	0.93	79.32
250.00	0.58	78.76	249.99	1.20	0.21	1.20	0.70	1.22	80.11
275.00	0.47	77.83	274.99	1.43	0.26	1.43	0.45	1.45	79.83
300.00	0.45	97.42	299.99	1.63	0.27	1.62	0.63	1.65	80.73
325.00	0.50	88.07	324.99	1.83	0.26	1.83	0.37	1.85	82.03
350.00	0.37	115.60	349.99	2.02	0.22	2.01	0.97	2.03	83.63
375.00	0.61	111.60	374.98	2.21	0.14	2.21	0.96	2.21	86.36
400.00	0.60	106.53	399.98	2.46	0.05	2.46	0.22	2.46	88.73
425.00	0.72	104.94	424.98	2.73	-0.02	2.74	0.51	2.74	90.48
450.00	0.74	90.13	449.98	3.05	-0.06	3.05	0.76	3.05	91.20
475.00	0.69	87.75	474.98	3.36	-0.06	3.36	0.22	3.36	91.00
500.00	0.70	87.91	499.98	3.67	-0.05	3.67	0.04	3.67	90.73
525.00	0.52	86.18	524.97	3.93	-0.03	3.93	0.75	3.93	90.49
550.00	0.51	80.19	549.97	4.15	-0.01	4.15	0.22	4.15	90.10
575.00	0.36	84.67	574.97	4.34	0.02	4.34	0.62	4.34	89.75
600.00	0.34	88.13	599.97	4.49	0.03	4.49	0.11	4.49	89.63
625.00	0.21	85.93	624.97	4.61	0.03	4.61	0.52	4.62	89.57
650.00	0.29	88.41	649.97	4.72	0.04	4.72	0.33	4.72	89.52
675.00	0.18	133.18	674.97	4.82	0.01	4.82	0.83	4.82	89.83
700.00	0.20	125.23	699.97	4.88	-0.04	4.88	0.15	4.88	90.44
725.00	0.18	158.15	724.97	4.93	-0.10	4.93	0.44	4.93	91.16
750.00	0.22	153.86	749.97	4.97	-0.18	4.97	0.16	4.97	92.07
775.00	0.14	109.95	774.97	5.02	-0.23	5.02	0.61	5.02	92.67
800.00	0.26	143.73	799.97	5.08	-0.29	5.08	0.64	5.09	93.27
825.00	0.33	136.90	824.97	5.16	-0.39	5.16	0.31	5.18	94.30
850.00	0.26	145.38	849.97	5.24	-0.49	5.25	0.32	5.27	95.31

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	°/100ft	ft	deg
875.00	0.27	141.63	874.97	5.31	-0.58	5.31	0.07	5.35	96.23
900.00	0.39	142.40	899.97	5.39	-0.69	5.40	0.51	5.45	97.32
925.00	0.21	161.93	924.97	5.46	-0.81	5.47	0.82	5.53	98.39
950.00	0.28	165.30	949.97	5.49	-0.91	5.50	0.28	5.57	99.40
975.00	0.17	148.87	974.97	5.52	-1.00	5.53	0.51	5.62	100.25
1000.00	0.27	139.55	999.97	5.58	-1.08	5.59	0.44	5.69	100.91
1025.00	0.18	188.54	1024.97	5.61	-1.16	5.62	0.82	5.74	101.67
1050.00	0.18	172.87	1049.97	5.61	-1.24	5.62	0.20	5.76	102.44
1075.00	0.16	203.75	1074.97	5.60	-1.31	5.61	0.37	5.77	103.15
1100.00	0.22	187.30	1099.97	5.58	-1.39	5.59	0.33	5.76	103.97
1125.00	0.09	185.79	1124.97	5.57	-1.46	5.59	0.51	5.77	104.65
1150.00	0.12	207.97	1149.97	5.55	-1.50	5.57	0.19	5.77	105.11
1175.00	0.17	258.92	1174.97	5.51	-1.53	5.52	0.53	5.73	105.53
1200.00	0.18	257.44	1199.97	5.43	-1.55	5.45	0.04	5.67	105.88
1225.00	0.20	277.40	1224.97	5.35	-1.55	5.37	0.29	5.59	106.13
1250.00	0.16	244.11	1249.97	5.27	-1.56	5.29	0.45	5.52	106.44
1275.00	0.20	253.44	1274.97	5.20	-1.59	5.22	0.19	5.46	106.93
1300.00	0.07	343.87	1299.97	5.16	-1.59	5.18	0.84	5.41	107.04
1325.00	0.19	274.19	1324.97	5.11	-1.57	5.13	0.72	5.36	107.00
1350.00	0.08	279.67	1349.97	5.05	-1.56	5.07	0.45	5.31	107.13
1375.00	0.21	275.61	1374.97	4.99	-1.56	5.01	0.53	5.24	107.25
1400.00	0.24	289.65	1399.97	4.89	-1.53	4.91	0.25	5.15	107.33
1425.00	0.27	273.97	1424.97	4.79	-1.51	4.80	0.29	5.04	107.46
1450.00	0.19	262.78	1449.97	4.69	-1.51	4.70	0.34	4.94	107.82
1475.00	0.25	269.47	1474.97	4.59	-1.52	4.61	0.26	4.85	108.24
1500.00	0.21	240.57	1499.97	4.49	-1.54	4.51	0.49	4.77	108.87
1525.00	0.21	278.02	1524.97	4.41	-1.56	4.43	0.55	4.69	109.40
1550.00	0.19	287.78	1549.97	4.32	-1.54	4.34	0.17	4.61	109.53
1575.00	0.17	298.43	1574.97	4.25	-1.51	4.27	0.15	4.53	109.47
1600.00	0.17	325.22	1599.97	4.20	-1.46	4.22	0.32	4.46	109.12
1625.00	0.05	315.37	1624.97	4.17	-1.42	4.19	0.49	4.42	108.77
1650.00	0.07	310.70	1649.97	4.15	-1.40	4.17	0.09	4.40	108.63

MD ft	INC deg	AZIM deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS °/100ft	CLOSURE DIST ft	CLOSURE DIR deg
1675.00	0.08	130.04	1674.97	4.15	-1.41	4.17	0.61	4.40	108.64
1700.00	0.13	185.80	1699.96	4.16	-1.44	4.18	0.42	4.42	109.07
1725.00	0.13	175.13	1724.96	4.16	-1.50	4.18	0.10	4.44	109.76
1750.00	0.22	191.40	1749.96	4.15	-1.58	4.17	0.38	4.46	110.70
1775.00	0.21	199.32	1774.96	4.13	-1.67	4.15	0.12	4.47	111.88
1800.00	0.11	184.44	1799.96	4.11	-1.73	4.13	0.44	4.48	112.74
1825.00	0.23	223.48	1824.96	4.07	-1.79	4.09	0.66	4.47	113.63
1850.00	0.29	234.53	1849.96	3.99	-1.86	4.01	0.29	4.42	114.95
1875.00	0.21	256.11	1874.96	3.89	-1.91	3.91	0.48	4.35	116.05
1900.00	0.22	260.95	1899.96	3.80	-1.93	3.82	0.07	4.28	116.81
1925.00	0.06	250.65	1924.96	3.74	-1.94	3.76	0.61	4.23	117.31
1950.00	0.04	263.00	1949.96	3.72	-1.95	3.74	0.09	4.22	117.52
1975.00	0.10	317.29	1974.96	3.69	-1.93	3.71	0.34	4.19	117.49
2000.00	0.03	77.32	1999.96	3.68	-1.92	3.71	0.49	4.17	117.33
2025.00	0.12	43.34	2024.96	3.71	-1.89	3.73	0.37	4.18	116.92
2050.00	0.04	359.61	2049.96	3.73	-1.87	3.75	0.38	4.19	116.48
2075.00	0.08	119.91	2074.96	3.74	-1.87	3.76	0.40	4.20	116.40
2100.00	0.14	166.21	2099.96	3.76	-1.91	3.78	0.41	4.24	116.72
2125.00	0.08	154.45	2124.96	3.78	-1.95	3.80	0.25	4.27	117.17
2150.00	0.16	210.09	2149.96	3.77	-2.00	3.79	0.53	4.28	117.77
2175.00	0.23	253.66	2174.96	3.70	-2.04	3.72	0.65	4.24	118.72
2200.00	0.23	293.82	2199.96	3.60	-2.03	3.63	0.64	4.16	119.28
2225.00	0.15	306.00	2224.96	3.53	-1.99	3.55	0.37	4.08	119.29
2250.00	0.20	29.21	2249.96	3.53	-1.94	3.55	0.93	4.04	118.63
2275.00	0.14	63.92	2274.96	3.58	-1.89	3.60	0.46	4.06	117.67
2300.00	0.10	149.31	2299.96	3.61	-1.89	3.64	0.67	4.10	117.48
2325.00	0.10	158.15	2324.96	3.63	-1.93	3.66	0.06	4.13	117.83
2350.00	0.17	208.36	2349.96	3.62	-1.98	3.65	0.53	4.15	118.54
2375.00	0.33	298.24	2374.96	3.54	-1.98	3.56	1.49	4.08	119.07
2400.00	0.27	329.70	2399.96	3.45	-1.90	3.47	0.70	3.96	118.65
2425.00	0.20	1.17	2424.96	3.42	-1.80	3.44	0.57	3.89	117.63
2450.00	0.09	44.08	2449.96	3.44	-1.74	3.46	0.61	3.87	116.78

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	°/100ft	ft	deg
2475.00	0.12	326.78	2474.96	3.43	-1.71	3.46	0.53	3.85	116.31
2500.00	0.14	308.98	2499.96	3.40	-1.67	3.42	0.17	3.80	116.01
2525.00	0.31	318.82	2524.96	3.33	-1.60	3.35	0.71	3.71	115.50
2550.00	0.27	326.68	2549.96	3.26	-1.50	3.27	0.23	3.60	114.59
2575.00	0.41	347.26	2574.96	3.21	-1.36	3.22	0.74	3.50	112.92
2600.00	0.39	354.02	2599.96	3.18	-1.19	3.19	0.20	3.41	110.43
2625.00	0.37	23.30	2624.96	3.20	-1.03	3.22	0.78	3.38	107.75
2650.00	0.34	5.62	2649.96	3.24	-0.88	3.25	0.45	3.37	105.15
2675.00	0.23	14.39	2674.96	3.27	-0.76	3.27	0.48	3.36	103.05
2700.00	0.19	333.78	2699.96	3.26	-0.67	3.27	0.60	3.34	101.64
2725.00	0.47	330.81	2724.96	3.19	-0.55	3.20	1.10	3.25	99.70
2750.00	0.40	329.80	2749.96	3.10	-0.38	3.11	0.28	3.13	97.03
2775.00	0.47	11.86	2774.96	3.08	-0.21	3.09	1.27	3.09	93.86
2800.00	0.19	7.87	2799.96	3.11	-0.07	3.11	1.14	3.11	91.25
2825.00	0.21	340.08	2824.96	3.10	0.02	3.10	0.40	3.10	89.70
2850.00	0.33	324.37	2849.96	3.05	0.12	3.04	0.54	3.05	87.79
2875.00	0.35	324.63	2874.96	2.96	0.24	2.96	0.11	2.97	85.39
2900.00	0.41	334.44	2899.96	2.88	0.38	2.87	0.35	2.90	82.42
2925.00	0.34	357.77	2924.95	2.84	0.54	2.83	0.66	2.88	79.24
2950.00	0.48	0.97	2949.95	2.84	0.72	2.83	0.53	2.92	75.78
2975.00	0.26	35.25	2974.95	2.88	0.87	2.87	1.20	2.99	73.15
3000.00	0.27	337.82	2999.95	2.89	0.97	2.88	1.01	3.04	71.41
3025.00	0.44	333.86	3024.95	2.83	1.11	2.81	0.71	3.02	68.50
3050.00	0.45	22.16	3049.95	2.82	1.29	2.81	1.46	3.09	65.39
3075.00	0.16	3.27	3074.95	2.86	1.41	2.85	1.23	3.18	63.62
3100.00	0.10	343.45	3099.95	2.86	1.47	2.84	0.29	3.20	62.68
3125.00	0.46	359.62	3124.95	2.85	1.59	2.84	1.45	3.25	60.72
3150.00	1.16	33.46	3149.95	3.00	1.90	2.97	3.27	3.53	57.42
3175.00	1.61	31.90	3174.94	3.33	2.41	3.30	1.80	4.08	53.86
3200.00	2.39	24.65	3199.93	3.74	3.18	3.70	3.31	4.88	49.33
3225.00	3.46	21.67	3224.89	4.25	4.36	4.20	4.32	6.05	43.93
3250.00	3.76	22.60	3249.84	4.86	5.82	4.79	1.21	7.53	39.49

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	°/100ft	ft	deg
3275.00	3.81	24.78	3274.79	5.54	7.33	5.45	0.61	9.13	36.67
3300.00	3.69	23.87	3299.74	6.23	8.82	6.13	0.56	10.74	34.80
3325.00	3.45	13.33	3324.69	6.75	10.28	6.63	2.78	12.23	32.80
3350.00	3.68	351.99	3349.64	6.83	11.81	6.69	5.35	13.57	29.53
3375.00	3.76	348.69	3374.59	6.57	13.41	6.42	0.92	14.86	25.58
3400.00	3.72	349.41	3399.53	6.28	15.01	6.11	0.26	16.20	22.14
3425.00	3.71	345.97	3424.48	5.96	16.59	5.76	0.89	17.56	19.16
3450.00	3.83	337.70	3449.43	5.46	18.14	5.25	2.23	18.89	16.13
3475.00	4.27	327.03	3474.37	4.66	19.70	4.42	3.49	20.19	12.66
3500.00	4.39	318.40	3499.29	3.53	21.20	3.28	2.65	21.45	8.81
3525.00	5.03	309.23	3524.21	2.06	22.60	1.80	3.94	22.67	4.55
3550.00	5.50	301.00	3549.11	0.20	23.91	-0.08	3.55	23.91	359.82
3575.00	5.82	298.78	3573.98	-1.92	25.14	-2.21	1.57	25.24	354.97
3600.00	6.74	291.92	3598.83	-4.38	26.30	-4.68	4.74	26.71	349.90
3625.00	7.60	288.55	3623.64	-7.29	27.37	-7.61	3.81	28.41	344.46
3650.00	8.45	285.23	3648.39	-10.62	28.38	-10.95	3.87	30.42	338.90
3675.00	9.68	283.30	3673.08	-14.42	29.35	-14.77	5.08	32.85	333.29
3700.00	10.08	281.22	3697.71	-18.60	30.25	-18.96	2.15	35.70	327.93
3725.00	10.65	276.48	3722.30	-23.04	30.94	-23.40	4.11	38.79	322.90
3750.00	11.11	275.96	3746.85	-27.72	31.45	-28.09	1.86	42.17	318.23
3775.00	11.15	275.27	3771.38	-32.52	31.92	-32.89	0.56	45.84	314.14
3800.00	11.30	275.72	3795.90	-37.35	32.39	-37.74	0.68	49.73	310.64
3825.00	11.36	275.39	3820.42	-42.24	32.87	-42.62	0.36	53.82	307.64
3850.00	11.11	276.31	3844.94	-47.08	33.36	-47.47	1.22	58.02	305.10
3875.00	10.68	277.99	3869.49	-51.76	33.95	-52.16	2.16	62.23	303.06
3900.00	10.52	278.10	3894.06	-56.30	34.59	-56.71	0.62	66.43	301.38
3925.00	10.41	278.74	3918.65	-60.79	35.26	-61.20	0.66	70.63	299.95
3950.00	10.44	279.51	3943.23	-65.24	35.97	-65.67	0.57	74.88	298.71
3975.00	10.72	279.86	3967.81	-69.76	36.75	-70.19	1.14	79.23	297.63
4000.00	10.81	279.51	3992.37	-74.35	37.53	-74.80	0.46	83.69	296.65
4025.00	10.28	280.64	4016.95	-78.85	38.33	-79.30	2.29	88.08	295.80
4050.00	9.61	279.78	4041.57	-83.09	39.10	-83.55	2.75	92.25	295.08

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	°/100ft	ft	deg
4075.00	9.34	280.28	4066.23	-87.13	39.82	-87.60	1.15	96.23	294.44
4100.00	9.00	282.91	4090.91	-91.02	40.61	-91.51	2.15	100.11	293.93
4125.00	8.88	283.46	4115.61	-94.80	41.50	-95.29	0.60	103.93	293.53
4150.00	8.79	284.19	4140.31	-98.51	42.42	-99.02	0.56	107.72	293.19
4175.00	8.86	284.82	4165.01	-102.22	43.38	-102.73	0.47	111.51	292.89
4200.00	8.82	284.59	4189.72	-105.92	44.35	-106.45	0.21	115.32	292.62
4225.00	8.36	284.26	4214.43	-109.53	45.28	-110.07	1.85	119.02	292.36
4250.00	7.78	284.16	4239.19	-112.92	46.15	-113.47	2.32	122.49	292.13
4275.00	7.84	283.07	4263.96	-116.21	46.95	-116.77	0.64	125.85	291.90
4300.00	7.82	283.57	4288.72	-119.52	47.73	-120.08	0.29	129.22	291.68
4325.00	7.81	284.15	4313.49	-122.81	48.54	-123.38	0.31	132.59	291.48
4350.00	7.92	284.60	4338.25	-126.11	49.39	-126.70	0.48	135.99	291.30
4375.00	7.99	284.47	4363.01	-129.45	50.26	-130.05	0.30	139.42	291.13
4400.00	7.29	282.26	4387.79	-132.67	51.03	-133.28	3.04	142.71	290.95
4425.00	6.84	278.95	4412.60	-135.69	51.60	-136.30	2.41	145.74	290.74
4450.00	6.72	277.81	4437.43	-138.60	52.03	-139.22	0.74	148.63	290.49
4475.00	6.70	277.27	4462.26	-141.49	52.42	-142.12	0.26	151.47	290.24
4500.00	6.63	276.94	4487.09	-144.37	52.77	-145.00	0.33	154.30	290.00
4525.00	6.80	279.16	4511.92	-147.26	53.18	-147.89	1.24	157.16	289.78
4550.00	6.79	278.59	4536.74	-150.17	53.64	-150.81	0.27	160.07	289.58
4575.00	6.74	279.35	4561.57	-153.08	54.10	-153.72	0.41	162.96	289.39
4600.00	6.88	279.39	4586.39	-156.00	54.58	-156.64	0.55	165.88	289.21
4625.00	6.90	280.75	4611.21	-158.94	55.11	-159.60	0.66	168.84	289.05
4650.00	6.40	282.14	4636.04	-161.77	55.68	-162.44	2.10	171.71	288.92
4675.00	5.54	284.31	4660.91	-164.30	56.27	-164.97	3.56	174.30	288.83
4700.00	5.10	286.43	4685.80	-166.53	56.88	-167.20	1.94	176.62	288.79
4725.00	5.33	283.84	4710.69	-168.71	57.48	-169.40	1.31	178.88	288.74
4750.00	5.42	284.56	4735.58	-170.98	58.05	-171.67	0.47	181.22	288.68
4775.00	5.44	284.09	4760.47	-173.26	58.64	-173.96	0.20	183.58	288.63
4800.00	5.45	283.72	4785.36	-175.56	59.21	-176.26	0.14	185.94	288.57
4825.00	5.17	283.61	4810.25	-177.80	59.75	-178.51	1.12	188.24	288.51
4850.00	5.30	284.80	4835.15	-180.00	60.31	-180.72	0.67	190.52	288.46

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	°/100ft	ft	deg
4875.00	5.35	285.58	4860.04	-182.23	60.92	-182.96	0.36	192.83	288.42
4900.00	5.33	286.93	4884.93	-184.46	61.57	-185.19	0.51	195.16	288.39
4925.00	5.36	285.26	4909.82	-186.69	62.22	-187.43	0.63	197.48	288.36
4950.00	5.44	286.46	4934.71	-188.94	62.86	-189.69	0.54	199.83	288.33
4975.00	5.72	282.21	4959.59	-191.29	63.46	-192.04	1.99	202.26	288.29
5000.00	6.03	279.01	4984.46	-193.79	63.93	-194.56	1.81	204.79	288.19
5025.00	6.27	279.34	5009.32	-196.43	64.35	-197.20	0.99	207.43	288.07
5050.00	6.62	280.19	5034.16	-199.19	64.83	-199.96	1.44	210.21	287.96
5075.00	6.65	278.87	5058.99	-202.04	65.31	-202.81	0.63	213.07	287.85
5100.00	6.75	278.91	5083.82	-204.91	65.76	-205.70	0.38	215.95	287.73
5125.00	6.84	278.34	5108.65	-207.83	66.20	-208.62	0.43	218.87	287.61
5150.00	6.79	278.09	5133.47	-210.76	66.63	-211.56	0.21	221.80	287.48
5175.00	6.73	279.73	5158.30	-213.66	67.08	-214.46	0.81	224.71	287.37
5200.00	6.36	280.77	5183.13	-216.46	67.59	-217.27	1.55	227.54	287.28
5225.00	6.66	282.28	5207.97	-219.23	68.16	-220.04	1.40	230.36	287.21
5250.00	6.71	282.75	5232.80	-222.07	68.79	-222.88	0.27	233.26	287.15
5275.00	6.72	283.18	5257.63	-224.91	69.44	-225.73	0.22	236.17	287.10
5300.00	6.48	282.10	5282.46	-227.70	70.07	-228.54	1.08	239.04	287.05
5305.00	6.60	282.34	5287.43	-228.26	70.19	-229.10	2.38	239.61	287.03